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Survey role and important of surfaces structureand β-lactamase of *Bacillus cereus* in drug resistance

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Background: S-layer is a outer protein in bacteria and archaea which intensifies bacterial pathogenicity due to inhibiting antibiotic's entrance to cells. Because staffs and hospital surfaces have a major role in nosocomial infections,contaminating this source with S-layer and β-lactamase positive strains of B. cereus can lead to spread the antibiotic resistant nosocomial infections. In this study, in addition to determine the frequency of S-layer and β-lactamase positive strains in hospital environment, their function in inhibition of antibiotic's entrance has been surveyed.

Methods: The descriptive research was performed on 274 samples isolated from Azzahra hospital and Isfahan University during 2005/2007. In order to preparation of samples, 16 hours bacterial culture in TSA (Tryptone Soya Agar) were used and then electrophoresis with 10X SDS-PAGE were performed. Antibiogram were performed with Kirby Bauer method and β-lactamase

Results: From 247 isolated bacteria, frequency of B. cereus strains was %9.49. Eleven sample (84/6%) from 13 isolated B. cereus of staff hand and 1 sample (7/7%) from 13 isolated B.cereus from hospital surfaces produce S-layer nanostructure. According to antibiogram result, non producer S-layer strains, in comparative S-layer producer strains, were more sensitive to antibiotics and all Slayer producer B.cereus strains, produce β-lactamase.

Conclusion: This study show high prevalence S-layer and β-lactamase producer B. cereus strains in hospital, that lead to increase antibiotic resistance nosocomial infection and is necessary go on to reduce transfer virulence agent and antibiotic resistant in pathogen bacteria.

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High prevalence of multidrug resistant bacterial infections in Nepalese patients

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Background: The multidrug resistant (MDR) bacterial infections have threatened the current antimicrobial therapy globally. Particularly, the impact due to MDR bacterial infections in low-resource developing countries are even greater than well-resource developed countries.The updated information on MDR bacterial infections is essential for appropriate antimicrobial therapy.The present study aimed to determine the status of multidrug resistance among bacterial pathogens, the antimicrobial susceptibility pattern, and the status of production of extended-spectrum β-lactamase.

Methods: All samples and isolates were investigated by standard laboratory procedures at Kathmandu Model hospital. All bacterial infection cases were confirmed based upon the positive culture growth, the symptoms and the other established criteria for acquisition of infections. Antibiotic susceptibility test was performed by Kirby Bauer's disc diffusion method. Evaluation of ESBL production was performed by double disc synergy test (DDST) method.

Results: Totally 122 (36.3%) MDR bacterial infections were observed among 336 patients. The MDR bacterial infections were found at higher rate among the patients of age-group ≥50 years (60.0%) than *Escherichia coli* (*E. coli*) (59.8%), followed by *Citrobacter* spp. (9%). Out of the 59 isolates suspected for ESBL activity, 27 (45.8%) were found ESBL producers. The ESBL activity was found in 14% (27/193) *E. coli* isolates, whereas in 37% (27/73) of MDR *E. coli* isolates. The majority of ESBL producers were shown co-resistance to other classes of antibiotics, including fluoroquinolone (ciprofluoxacin [96.3%] and norfloxacin [96%]), co-trimoxazole (96.3%), aminoglycosides (gentamycin [69.3%] and amikacin [8%]), chloramphenicol (20.8%) and nitrufurantoin (24%). However, all ESBL producers were susceptible to carbapenems. Out of the total isolates, methicillin-resistant *Staphylococcus aureus* (MRSA) was observed in 0.6%, whereas in 11.8% of the total *Staphylococcus aureus* isolates. The independent risk factors for acquisition of ESBL-producing MDR bacterial infections were previous use of antibiotics (OR 5.07; 95% CI 1.42–18.05; p = 0.011) and hospitalization (OR 3.88; 95% CI 1.17–12.81; p = 0.02).High prevalence of multidrug resistant bacterial infection in Nepalese patients.

Table 1.

Distribution of MDR bacterial isolates

Organisms	Isolates		MDR isolates		ESBL-pioducers	
	n	%	n	%	n	% (of total MDR isolates)
Escherichia. coli	193	57.4	73	37.8	27	37
Salmonella, Typhi	28	8.3	1	3.61429	NT	
Salmonella Paratyphi A	24	7.1	0	0	NT	
Staphylococcus aureus	17	5	8	47	NT	
Staphylococcus saprophyticus	15	4.5	9	60	NT	
Citrobacter freundii	12	3.6	11	91.7	NT	
Pseudomonas. aeruginosa	6	1.8	4	66.7	NT	
S, epidermidis	6	1.8	2	33.3	NT	
C. diversus	5	1.5	2	40	NT	
Proteus mirabilis	5	1.5	2	40	0	0
Enterobacter cloacae	4	1.2	3	75	NT	
K. pneumonia	4	1.2	1	25	0	0
E. aerogenes	3	0.9	1	33.3	NT	
Enterococcus faecalis	3	0.9	3	100	NT	
Klebsiella oxytoca	2	0.6	1	50	0	0
Acinetobacter spp.	2	0.6	1	50	NT	
Streptococcus pneumoniae	2	0.6	0	0	XT	
P. vulgaris	1	0.3	0	0	NT	
Morganella morganii	1	0.3	0	0	XT	
Neisseria gonorrheae	1	0.3	0	0	NT	
N. meningitidis	1	0.3	0	0	XT	
Streptococcus pyogens	1	0.3	0	0	NT	
Total	336	100	122	36.3	27	35

Conclusion: The high prevalence of MDR bacterial infections was observed in Nepalese patients. Resistance patterns shown by